

NAME.....

ROLL NO.....

JAWAHARLAL TECHNOLOGICAL UNIVERSITY-2008

**III B.TECH SUPPLEMENTARY EXAMINATIONS
METROLOGY
(MECHANICAL ENGINEERING)**

AUG/SEP 2008

TIME-3 HOUR
MARK-80

ANSWER ANY FIVE QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS.

1. (a) Explain the terms: Limits (upper & lower) of tolerance and fit. Sketch the conventional diagram to represent these terms for a shaft and a hole.
- (b) For each of the following shaft and hole pair, calculate shaft tolerance, hole tolerance and analyze whether the pair is
- Clearance fit
 - Transition fit
 - Interference fit.
- Pair 1: Hole:- $30+0.02$
 $+0.00\text{mm}$ Shaft:- $30-0.04$
 $+0.005\text{mm}$
- Pair 2: Hole:- $30+0.06$
 $+0.00\text{mm}$ Shaft:- $30-0.03$
 $+0.05\text{mm}$
- Pair 3: Hole:- $30+0.05$
 $+0.00\text{mm}$ Shaft:- $30+0.08$
 $+0.05\text{mm}$
- Sketch the three fits on the same zero line.
2. (a) What are slip gauges? What are their uses?
- (b) What are the requirements of a good dial indicator? What are advantages of it?
3. Discuss various methods of taper measurement of plug and ring gauges.
4. (a) Explicate the classification of plain limit gauges.
- (b) Design general type GO and NO-GO gauges for components having 25 H8/f9 fit. The basic size falls in the diameter range of 18-30mm. The fundamental deviation for 'f' shaft= $(-5.5 D^{0.4})$ microns. The multipliers for 8 and 9 grades are 25 and 40. Take wear allowance as 10% of gauge tolerance. Sketch the gauges with values.
5. (a) What are the limitations and uses of optical flats?
- (b) Describe the working principle of interferometer with a neat sketch.
6. (a) Stylus type instruments are widely used despite several disadvantages-Explain
- (b) The heights of peaks and valleys of 20 successive points on a surface are 45, 30, 42, 25, 40, 25, 35, 24, 35, 18, 42, 34, 45, 31, 40, 30, 41, 24, 42, 18 microns respectively, measured over a length 20 mm, Determine CLA and RMS values of roughness surface.
7. (a) Enumerate various characteristics of a good comparator.
- (b) Explain the working of sigma comparator with special reference to cross strip lever in detail.
8. (a) "Measurement of effective diameter by three wires is more accurate than any other method" - Explain.
- (b) State various sources of errors in manufacture of gears.